

# *State of Arkansas*



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## Geospatial Strategic Business Plan

March 2010

This plan was formally and unanimously accepted and endorsed by the  
Arkansas Geographic Information Systems Board on March 3, 2010.

with support from



This document was produced by Applied Geographics, Inc. (AppGeo) under contract to the Arkansas Geographic Information Office (AGIO). This project was funded by a Cooperative Assistance Program (CAP) grant provided by the United States Geological Survey (USGS).

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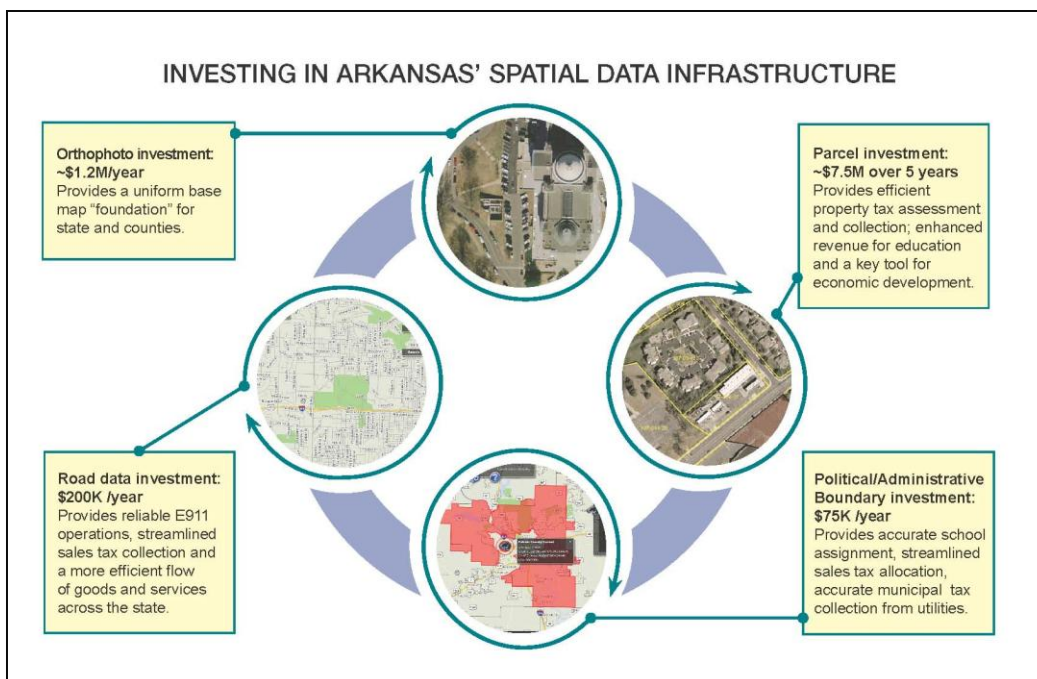
# Executive Summary

Almost 20 years ago, President Clinton, as the sitting Governor of Arkansas, drafted a letter of support for a geographic information systems (GIS) symposium aimed at local governments (see next page). In that letter, and referring to GIS, he wrote “I support the use of technology as a means to achieve the quality of government services our citizens deserve.” Over the past two decades Arkansas has made tremendous progress in developing and deploying GIS technology to improve “the quality of government services”. As documented in this strategic plan, today Arkansans apply GIS technology every day to help with property assessment; to protect the state’s natural resources; to respond to natural disasters; to encourage economic development, and to support a wide variety of additional government services.

Arkansas has made great progress in establishing law that clarifies statewide GIS responsibilities, developing first generation geospatial data, establishing technical infrastructure and building an effective statewide GIS office, the Arkansas Geographic Information Office (AGIO). One of the core roles of the AGIO as defined in its enabling legislation (i.e. HB-1356 of the 87<sup>th</sup> General Assembly) is “coordinat(ing) completion and maintenance of shareable statewide framework data...” Indeed, this strategic plan found that further investments to complete and improve the state’s GIS data is the highest priority among the state’s numerous state government, local government and private sector stakeholders. Nevertheless, there is not a reliable and recurring funding stream for making necessary *data investments*. Thus, the overarching strategic goal for this plan is “**to provide recurring funding for continual investment in, and improvement of the Arkansas Spatial Data Infrastructure.**” Specifically, and as illustrated below, further investments were recommended for four fundamental GIS data sets:

1. **Recurring orthophoto** program with a 3-year re-fresh cycle: \$1.2M/year
2. Completion of a **statewide parcel data layer**: \$7.5M investment spread across 5 years
3. Improve the accuracy and currency of **political and administrative boundaries**: \$75k/year
4. Improve the accuracy and currency of **roads data**: \$200k/year

Cumulatively, approximately \$1.5M of annual funding and a one-time investment of \$7.5M will result in the state creating a geospatial database that will rival any state in the country and will fully meet the needs of Arkansas’ active and engaged geospatial community. Everything else is in place, it is time to provide the AGIO the investment capital needed to fulfill its statutory role as custodian of the state’s geospatial data.



# Two Decades Later and We Are Almost There



STATE OF ARKANSAS  
OFFICE OF THE GOVERNOR  
State Capitol  
Little Rock 72201

Bill Clinton  
Governor

January 30, 1992

Dear Friend:

Improving the quality of government, education, and public services at any level often requires speedy access to information. Time lost in gathering facts from the massive amounts of public information burdens--sometimes critically--the decision making process.

Public sector decision makers all over Arkansas want to know how to make that process faster and more effective. A little known technology, GIS--Geographic Information Systems--is one innovative tool being used more and more throughout the country in the quest for timely, accurate, and reliable information. GIS can assist in lifting the burden of time consuming research when addressing problems and making plans for the state's human and natural resources.

I support the use of technology as a means to achieve the quality government services our citizens deserve. On March 5 and 6, 1992, the Arkansas GIS Users Forum and the UALR Division of Lifetime Education and Professional Development are sponsoring a symposium to introduce GIS and its capabilities to state and local government. The symposium, GIS in Arkansas: Present and Future, will present valuable ideas to senior level leaders like you.

I encourage you and members of your staff to attend this workshop. You will want to learn how this technology can help you in planning for the future of your community.

Sincerely,

A handwritten signature in dark ink, appearing to read "Bill Clinton".

Bill Clinton

BC:pn



# 1. Strategic Planning Methodology

## 1.1 PROJECT TEAM

The execution and supervision of this project was conducted by the following team:

**PROJECT OVERSIGHT.** Arkansas assembled a Strategic Planning Steering Committee that represented key stakeholder groups in the state. The following people and organizations participated in the Steering Committee:

**Shelby Johnson**, representing the Arkansas Geographic Information Office  
**William Sneed**, representing the United States Geological Survey  
**Tracy Moy**, representing the Arkansas Geographic Information Systems Board  
**Alan Price**, representing the Arkansas GIS Users Forum

The Steering Committee acted as an advisor throughout the project and served in the role of “executive editor” of the final document.

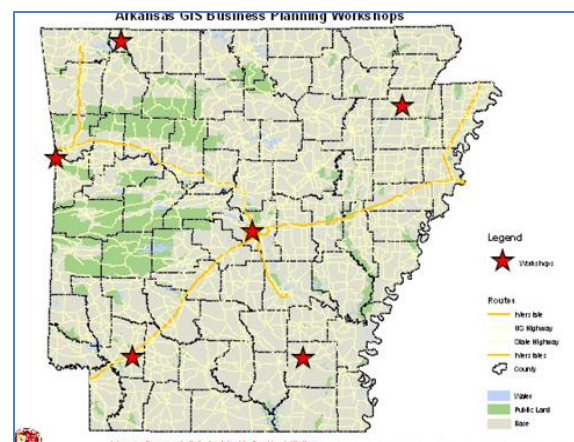
**PROJECT MANAGEMENT.** Direct project management was provided by the Arkansas Geographic Information Office, through its Director, Shelby Johnson. In addition to management of the contract, the AGIO provided invaluable logistical and research support throughout the project. In addition to Mr. Johnson, AGIO staff members Laron Dalby, Maria Owen, Adrian Clark, Glen Rhea and Rachel Hood made important contributions to this effort.

**PROJECT CONSULTANT.** Following a competitive procurement, Arkansas selected Applied Geographics, Inc. (AppGeo) from Boston, Massachusetts to provide project facilitation and report authoring on this project. Michael Turner, a principal in the firm, provide project management on behalf of AppGeo.

## 1.2 PROJECT ACTIVITIES

The project was initiated in August, 2009 and the following activities were conducted over the course of the next seven months:

1. **Kickoff & Project Planning Meeting**
2. **Conducted 5 Stakeholder Workshops throughout the state.** The map to the right illustrates the location of the workshops that were conducted.



Workshop locations, dates and attendance figures, were:

- ★ **Jonesboro**, August 17, 2009 – 29 attendees \*
- ★ **Little Rock**, August 19, 2009 – 60 attendees
- ★ **Monticello**, August 31, 2009 – 19 attendees
- ★ **Fort Smith**, September 1, 2009 – 37 attendees
- ★ **Hope**, September 2, 2009 – 22 attendees

\* Note, project team member attendance was only counted once, for Jonesboro, even though the project team attended all workshops.

Please see [Section 2.1](#) for further details on attendance; see [Appendix 1](#) for workshop presentation materials; and, see [Appendix 2](#) for summaries of each workshop.

3. **Key Stakeholder Interviews.** Over the course of the project, the project team conducted 17 interviews with key leaders and decision makers within the current administration, county government and other organizations that represent geospatial stakeholders or implement geospatial technologies. The table below catalogs the interviews that were conducted.

“GIS technology is becoming increasingly important to county government for increased efficiencies of accuracy, time use and service delivery by our County Judges, Assessors, Sheriffs and emergency management personnel. A geographic information system that captures, stores, analyzes, manages and presents data that is linked to a location is extremely useful for real estate assessment; for maintaining and building a county road and bridge system; for support of public safety and criminal justice provided by law enforcement; and for information needed by emergency planners to calculate emergency response times and logistics during natural disasters as well as singular emergencies.”

**Eddie Jones**  
Executive Director  
Association of Arkansas Counties

<b>Randy Zook</b> , Arkansas Chamber of Commerce	<b>Butch Calhoun</b> , Arkansas Rural Services
<b>Don Zimmerman</b> , Arkansas Municipal League	<b>Maria Haley</b> , Arkansas Economic Development Commission
<b>Eddie Jones</b> , Arkansas Counties Association	<b>Richard Davies</b> , Arkansas Department of Parks & Tourism
<b>Lee Ann Kizzar</b> , Arkansas Assessor's Association	<b>Debbie Asbury</b> , Arkansas Assessment Coordination
<b>Dr. Thomas Kimbrell</b> , Arkansas Department of Education	<b>Bill Stovall</b> , Office of the Speaker of the House
<b>Mike Stormes</b> , State Budget Director	<b>Senator John Paul Capps</b>
<b>Jon Moran</b> , Governor Beebe's Office	<b>Representative Kathy Webb</b>
<b>Kathryn Hazelett</b> , Governor Beebe's Office (since departed)	<b>Jimmy Hart</b> , Conway County Judge
<b>Emily Jordan-Cox</b> , Governor Beebe's Office	



4. **Presentation of initial findings at State GIS Conference.** Following the workshops and interviews, the project team developed a slate of findings and recommendations. These findings and recommendations were then presented to the broader GIS stakeholder community during the 2009 Arkansas GIS User's Forum Conference in Eureka Springs. The goal was to determine whether there was general agreement with the direction the plan was taking and to solicit a last round of input.
5. **Report Authoring.** Following the GIS User Forum Conference and the last round of input, this written Geospatial Strategic Business Plan was drafted.
6. **Roll-out the Plan.** With the release of this plan the AGIO will pursue a variety of educational and outreach activities aimed at presenting the substance of recommendations and advocating that they be carried out.

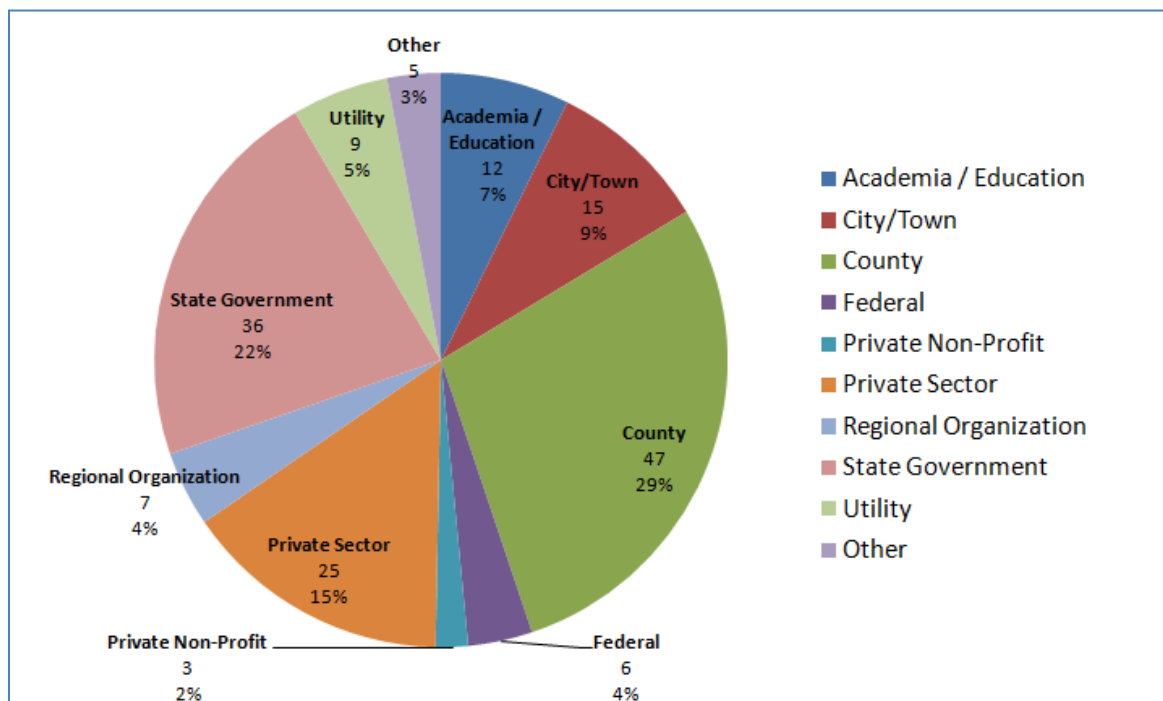
## 2. Current Situation

### 2.1 WHO IS THE ARKANSAS GIS STAKEHOLDER COMMUNITY?

Arkansas has a large and highly engaged GIS stakeholder community composed of public and private sector organizations that implement the technology. The stakeholder workshop attendance reflects the size and breadth of this community. The map to the right illustrates the spatial distribution of workshop attendance. The figure below shows the total workshop attendance of 165 people distributed across 10 major sectors.



The image at left shows workshop attendance as illustrated by pins that each attendee was asked to place on the map showing where they lived. Each color (e.g. red, black, yellow, etc.) represented a different workshop location.



### 2.2 WHAT IS ARKANSAS'S GEOSPATIAL DEVELOPMENT STATUS?

The following presents two assessments of Arkansas' geospatial development status. First, Arkansas is rated using a set of criteria developed by the National States Geographic Information Council (NSGIC), the trade organization that represents state government geospatial programs. Second, the status of

geospatial data development is listed for each of the seven “framework data layers” considered to be part of the National Spatial Data Infrastructure.

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### 2.2.1 Relative To NSGIC’s “9 Criteria For A Successful Statewide GIS Program”

The National States Geographic Information Council has published a listing of “9 Criteria for a Successful Statewide GIS Program.” While these are not firm, binary criteria, they provide a measure by which different states can be compared. As stated in the Fifty States Initiative Action Plan, these criteria “establish a benchmark for statewide coordination activities...(and) are essential for effective statewide coordination of geospatial technologies.” Using different terms, the most successful states tend to have these things in common.

The following describes Arkansas’ extremely strong rating against these criteria.

1. **A full-time, paid coordinator position is designated and has the authority to implement the state’s business and strategic plans:**  
**YES.** The Director of the AGIO serves this function.
2. **A clearly defined authority exists for statewide coordination of geospatial information technologies and data production:**  
**YES.** The Arkansas Geographic Information Systems Board (also known as “State GIS Board”) fulfills this function. The predecessor to the State GIS Board, the State Land Information Board was created, and provided coordination authority in 1997 via Arkansas Code 15-21-501<sup>1</sup>. In 2009, the current name was given via Act 244 of the 87th Arkansas General Assembly.
3. **The statewide coordination office has a formal relationship with the state’s Chief Information Officer (CIO):**  
**YES.** The Director of Arkansas Department of Information Systems (DIS) sits on State GIS Board by statute. In addition, the AGIO was formerly housed within DIS and maintains a good working relationship with that organization. Finally, the AGIO maintains a formal contractual relationship with DIS whereby DIS provides data center services (i.e., housing AGIO servers).
4. **A champion (politician, or executive decision-maker) is aware and involved in the process of geospatial coordination:**  
**YES.** There is growing awareness of both the AGIO and GIS in general at senior staff levels in both state and county government and within the legislature. In addition, during 2009 the AGIO was reorganized out of DIS and it now reports directly into the Governor’s office. Through the new organizational structure, the AGIO maintains direct, formal communication channels with the Governor’s Office.

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<sup>1</sup> See [http://www.gis.state.ar.us/ASUB/Ar\\_Code\\_15-21-501.htm](http://www.gis.state.ar.us/ASUB/Ar_Code_15-21-501.htm) for the language of the code.

5. **Responsibilities for developing the National Spatial Data Infrastructure and a State Clearinghouse are assigned:**

**YES.** The AGIO fulfills these functions. As stated on the AGIO's Web-site, "We coordinate the completion and maintenance of shareable statewide framework data...Our premier service is GeoStor the state's geographic information systems platform." The state has clearly taken on NSDI framework data maintenance and the GeoStor platform functions as the state data clearinghouse.

6. **The ability exists to work and coordinate with local governments, academia, and the private sector:**

**YES.** The AGIO fulfills these functions. As stated on the AGIO's Web-site, "We coordinate with cities, counties, state, federal governments, and the private sector to reduce the duplication of effort." Specifically, the AGIO maintains two formal programs that "work and coordinate with local governments." First, the County Assessor's Map Program (CAMP) provides a "coordinated statewide initiative to build a statewide digital cadastre." Second, the Arkansas Centerline File Program (ACF) involves a "coordinated statewide initiative to build statewide centerlines in a common attribute and spatial standard. Program participants include all levels of government and the private sector."

7. **Sustainable funding sources exist to meet project needs:**

**PARTIAL.** Although the AGIO has a sustainable budgetary line item that funds operations (i.e. staff and technology) there is *no* sustainable funding available for one of AGIO's core responsibilities: geospatial data development and maintenance. Indeed, the core recommendations of this study involve developing a sustainable funding model that provides ongoing funding and investment in the states geospatial data assets.

8. **GIS Coordinators have the authority to enter into contracts and become capable of receiving and expending funds:**

**YES.** The AGIO is a formal part of Arkansas state government and has these capabilities.

9. **The Federal Government works through the statewide coordinating authority:**

**YES.** The AGIO and the State GIS Board are actively and formally engaged with the federal government. At the same time, there are opportunities for this coordination to be strengthened, including the federal government's own efforts to better coordinate its activities, across all of its departments, with states.

## 2.2.2 Relative To Framework Data Layer Development Status

The National Spatial Data Infrastructure defines the concept of seven “federal framework” data layers. This definition, found on the Federal Geographic Data Committee’s (FGDC) Web-site<sup>2</sup>, builds on the notion that “GIS applications of many different disciplines have a recurring need for a few themes of data.” Thus, framework data sets represent the common needs of the GIS community and are therefore considered “one of the key building blocks and...the data backbone of the NSDI.”

All public framework data are available from the GeoStor database maintained by the AGIO. The following summarizes the status of Arkansas’ framework data sets, and further details on these data can be found at the GeoStor Web-site: <http://www.geostor.arkansas.gov> (type “metadata” into the search box).

Framework Layer	Arkansas Status
<b>1. Geodetic Control</b>	Primary data set is the NOAA-National Geodetic Survey collection nationwide survey monuments.
<b>2. Parcels</b>	Managed individually by each of the 75 counties. State supports parcel automation through AGIO CAMP program, and collects and distributes existing parcel data. Approximately 54% of the state’s 2,130,000 parcels are automated as polygons. Approximately 13 counties have completed their parcel polygon automation.
<b>3. Transportation/Roads</b>	The state has recently completed a standardized, statewide road centerline file as a collaborative effort with the 75 counties. The AGIO coordinated this effort through the Arkansas Centerline File (ACF) program
<b>4. Hydrography</b>	The Department of Environmental Quality (ADEQ) has been formally designated as the state’s data steward and collaboratively developed the statewide hydrography data set in association with USGS’s National Hydrographic Data Set Program (NHD). ADEQ will continue to maintain this data set.
<b>5. Elevation</b>	The best available statewide data set is the USGS 30-meter nationwide DEM. USGS 10-meter DEMs are available for approximately 40% of the USGS topographic quad sheets. In addition, there is a statewide 5-meter DEM created as part of the last orthoimagery mission; however, this data set has yet to have its quality certified by the USGS for inclusion in Federal data sets.
<b>6. Aerial Photography</b>	Statewide 1-meter resolution, 4-band color imagery from 2006 is available on a statewide basis. Older color infrared data from 2001 and black-and-white imagery from 1994-1996 are also available.
<b>7. Political/Administrative Boundaries</b>	The AGIO currently coordinates the collection/creation of political and administrative boundaries covering: counties, cities, legislative districts and school districts in association with several sister agencies. County boundaries emanate from USGS source materials, other boundaries are collected from counties and other jurisdictions.

<sup>2</sup> See: <http://www.fgdc.gov/framework> for further information.

## 2.3 ARKANSAS'S GEOSPATIAL STRENGTHS, WEAKNESSES, CHALLENGES & OPPORTUNITIES

### 2.3.1 Geospatial Strengths

- ★ Arkansas has an extremely **engaged, open and communicative geospatial stakeholder community**. As reflected throughout the stakeholder workshops – attended by 165 stakeholders - large numbers of people care about statewide geospatial activities and freely provided their input and willingly shared their experiences. The Arkansas GIS User's Forum email list provides another manifestation of this collaborative spirit. The GIS Users Forum email list distributes several emails per week that share news of GIS development across the state. At other times, users post technical or data availability questions to the list. In almost every case these questions are answered by multiple people – from both the public and private sectors - with useful, practical and at times detailed technical advice. In short, people are willing to help and they want to see other Arkansans succeed.
- ★ In addition to widespread information sharing, the Arkansas geospatial stakeholder community exhibits uniquely **ubiquitous and rich data sharing across all levels of government**. In general, if a member the stakeholder community has geospatial data, then they willingly share it with their colleagues at no cost. This attitude is led by the AGIO which posts all of its data holdings for download at no fee via the GeoStor system. But unlike many other states, during the stakeholder workshops there were no reports of “data holdouts” or counties that sell their data for unreasonable fees. Arkansans seem to understand that the free flow of geospatial data benefits all.
- ★ The AGIO represents a **strong and effective statewide geospatial program**. Three noteworthy aspects of the AGIO include:
  - An extremely **strong geospatial data portal** with ready public access to the state's geospatial holdings. The portal has rich data holdings, an innovative architecture and user interface, and distributes data in a wide variety of formats including consumable web services.
  - Effective **awareness building across state and county government** and with the current Administration. The AGIO has invested time and energy in engaging with geospatial stakeholders across the state and throughout state government, and as a result is a well known and well respected entity. Arkansas GIS users understand what the AGIO does and view it as a resource that is willing, and able to help.
  - The AGIO has shown innovation and foresight in building two model programs (e.g. CAMP, ACF) that have explicitly involved **engagement with county governments to collaboratively create geospatial data**. These efforts have been instrumental in catalyzing the development of higher quality parcel and roads data, and they have

served to strengthen the bonds of state-county collaboration on geospatial activities.

- ★ Arkansas possesses **strong geospatial educational and academic resources** that are capable of producing a trained geospatial workforce and providing direct support to both state and county governments. Institutions that possess geospatial training facilities and capabilities include, but are not limited to:
  - University of Arkansas, Center for Advanced Spatial Technologies
  - University of Arkansas, Cooperative Extension Service
  - University of Arkansas, Little Rock
  - University of Arkansas, Monticello
  - Arkansas Tech University, Russellville through the Emergency Management degree program
  - University of Central Arkansas

In addition, several of the state's two-year colleges offer introductory programs in GIS.

Last, the Arkansas Department of Education (ADE), in association with ESRI has implemented the Environmental and Spatial Technologies<sup>3</sup> (EAST) program that is available to any of the 266 K-12 school districts in the state. As Jim Boardman, the ADE Assistant Commissioner for Research and Technology, states on the program's Web-site "This is an important step in providing educational opportunities for our students to meet the challenges of the twenty-first century. Learning GIS gives students important skills that can be applied in a wide range of occupations."

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### 2.3.2 Weaknesses & Challenges

- ★ Although there is a clear mandate for the AGIO to provide stewardship and coordination of the state's geospatial assets there is **no funding is dedicated to the maintenance, improvement, or expansion of these data assets**. According to the AGIO web-site, the AGIO "acts as the functional arm of the Arkansas Geographic Information Systems Board." The State GIS Board's original authorizing language as described in Arkansas Code 15-21-501 includes - as Item C under "duties responsibilities, and authority" – language that states "The board shall coordinate completion and maintenance of shareable statewide framework data.." In spite of this language the AGIO does not currently possess any budget for the explicit completion or maintenance of framework data. Data investments that have been made – such as the 2006 statewide orthoimages – have come through one time funding and/or the collaborative funding of a variety of state agencies. Thus, the State GIS Board and the AGIO have been given a responsibility without the proper ongoing funding to carry it out, and this has hindered data development progress.
- ★ In spite of its success in helping to foster increased geospatial activity across the state and within state government, the **AGIO staffing level has not kept pace with growing programs demand**.

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<sup>3</sup> See: [http://www.esri.com/news/releases/09\\_4qtr/k-12-arkansas.html](http://www.esri.com/news/releases/09_4qtr/k-12-arkansas.html) for further details.



Currently, the AGIO is staffed with 5 full-time equivalents and the supervision of two contract personnel funded through the streamlined sales tax program. While the reorganization that split the AGIO from DIS has had many positive aspects, it has also served to amplify this staffing shortfall since the AGIO previously had access to DIS administrative support staff. At present, the AGIO now has an increased administrative load as an independent agency without having any administrative staff. At a minimum, the office would benefit greatly from an administrative support position.

- ★ As with many states, particularly rural states, there is a persistent gap between the geospatial technical and investment capabilities of smaller, poorer counties and richer, more developed counties. Indeed, even acknowledging there are a few promising counter examples of strong small-county GIS operations, there remains a **gap between “GIS have” and “GIS have-not” counties**. This gap will prove an impediment to completing some statewide framework data initiatives such as parcels. In addition to considering providing direct funding support to “GIS have-nots”, there may be a requirement for further education of local government officials on the value of GIS and the types of return on investment (ROI) it delivers.
- ★ Counties have found that **it can be challenging to retain trained geospatial technical staff** in light of county government pay scales and the demand for GIS personnel. Counties often begin their GIS programs by hiring less experienced staff, perhaps a recent graduate, at lower pay levels and providing training. Counties have found that once these personnel gain proficiency their skill-set is marketable and many counties have lost GIS staff when they leave for higher paying jobs in other sectors. This can be particularly challenging to address since a competitive salary for a trained and experienced GIS technician can exceed the salary of a County Assessor.

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### 2.3.3 Opportunities

- ★ **Economic Development** remains one of the current priorities of the current administration and a high profile issue throughout the state. GIS has been used extensively in economic development and business recruiting efforts and there is wide acceptance of the value it adds to this important activity. This visibility and the nexus between the technology and Arkansas’ ability to compete in this arena provide important justifications for further investments in geospatial data.
- ★ Although many of county governments – particularly poorer and more rural counties - have been late to adopt GIS, advances in software, hardware and the availability of existing data have lowered the barriers to entry. **GIS technology is now more affordable and easier to deploy than ever before**. In short, it is easier to start now than it has been previously. Thus, there is an opportunity for “late adopters” to make rapid progress and catch up to other counties that have started earlier.

- ★ A variety of factors have coincided to make **the timing right** for Arkansas to make the next level of investments in its geospatial data infrastructure:
  1. With the recent reorganization that has made the AGIO an independent agency it is appropriate to review both its mission and its budget.
  2. As this report documents, geospatial technology has matured and these technologies support the current administration's priorities including *economic development, education* and *emergency response/public safety* in addition to many other public policy goals.
  3. There is wide recognition within both county and state government that advancing GIS provides meaningful benefits, and both levels of government will prosper from further investments.
  4. The state has been thorough and methodical in researching and documenting its requirements and presenting a coherent plan for meeting its needs. In short, the homework has been done to minimize risks and maximize the chances for success.

## 3. Visions & Goals

### 3.1 PROBLEM STATEMENT

Although the Arkansas Geographic Information Systems Board (AGISB) and the Arkansas Geographic Information Office (AGIO) are empowered through legislation to have the “responsibility” to *create, update, maintain, and disseminate framework spatial data*, there is currently **not a reliable, recurring funding stream that enables this mission to be fully carried out**. The AGIO’s authorizing act - Act 244 of the Regular Session of 2009 (House Bill 1356 of the 87<sup>th</sup> General Assembly) – contains the following specific language that reiterates this mission (emphasis added):

- ★ *Under Section 15-21-504. “Duties, responsibilities, and authority.”*
  - *Under Sub-section (c): “The board shall coordinate completion and maintenance of shareable statewide framework data...”*
  - *Under sub-section (d)(2)(A): “The board, using the technical support provided by the Arkansas Geographic Information Office, shall coordinate the *development and maintenance* of a statewide digital cadastre system.”*
  - *Under sub-section (d)(2)(C): “... shall coordinate the *development and maintenance* of a statewide road centerline database.”*
  - *Under sub-section (d)(2)(D): “...shall coordinate the *development and maintenance* of a statewide digital orthophotography database with a priority to be taken in leaf off conditions.”*

While the Act does not guarantee, or provide funding to complete this mission, it does direct the Board engage in “Recommending methods of financing...(and) Developing recommended priorities for the distribution of funds” [Section 15-21-504, Sub-sections (e)(4) and (e)(5)]. To date, the board has been unsuccessful in securing adequate recurring funding to fill identified data gaps, address existing data shortcomings and perform regular updates on key framework data sets. In short, the digital cadastre remains incomplete and the statewide road centerline program does not have funding to ensure that it can be kept current. Similarly, the current funding mechanisms have been unable to update the state’s orthophotography since 2006.

### 3.2 STRATEGIC GOAL

The overarching **strategic goal** of this plan is to:

To provide recurring funding for continual investment in, and improvement of the Arkansas Spatial Data Infrastructure.

The following sections of this plan identify the funding requirements for the Board and AGIO to fulfill their mission and suggest several “methods of financing” these activities. This includes undertaking focused

one-time efforts to complete framework data layers, ongoing activities to keep existing framework data properly maintained and properly staffing the AGIO to keep pace with its increased program demands.

### 3.3 PROGRAMMATIC GOALS

In order to grow Arkansas' future in economic development, improve the state's ability to respond to disaster events and to ensure that property tax revenues are fairly and efficiently collected to support education, the state should consider the following investments:

1. Recurring, annual **orthophotography** (i.e. digital aerial imagery): **\$1,167,000 annually**
2. Completion of **statewide parcels**: **\$1,503,000 annually** for five years
3. **Political and administrative boundary** data improvement: **\$75,000 annually**
4. **Road and address data** update and maintenance: **\$200,000 annually**

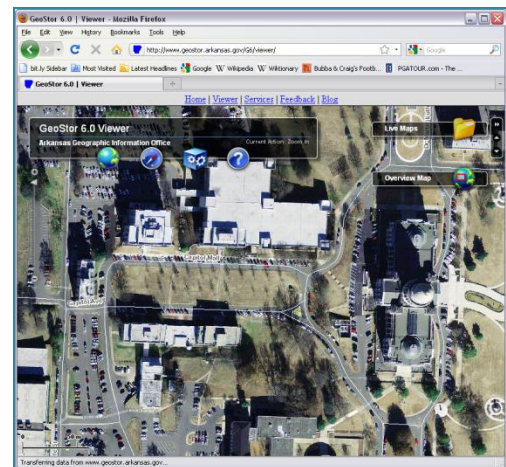
The following sections will provide a **concise business case**, including cost and benefit enumeration, for making each of these investments.

#### 3.3.1 Orthophotography – Annual Cost: \$1,167,000

**BACKGROUND.** Orthophotography is one of the most popular, versatile and important data sets maintained by the AGIO. According to AGIO records on the utilization of the GeoStor web services, between May, 2006 and June, 2009 orthophotography was accessed approximately 1.65 *million* times accounting for 22% of GeoStor's overall web service utilization.

Arkansas currently possesses excellent statewide color imagery at a 1 meter pixel resolution. However, currently these images are approaching four years in age and increasingly, particularly in areas experiencing development, they will cease to be accurate representations conditions on the ground. To maintain its usefulness, orthophotography data sets require periodic update through a new aerial photography mission. The "current" 2006 orthophotos represent the "third edition" and follow black and white imagery that was flown between 1994-1996 and a 2001 statewide mission. Funding for each of these previous missions has been pursued on a one-time basis and via a variety of funding sources with the AGIO playing a central coordinating role that has consumed significant amounts of time.

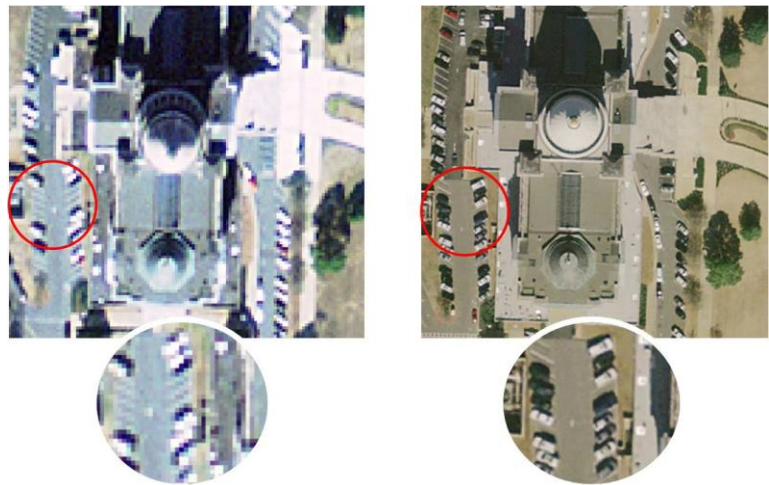
There is currently no regularized schedule nor funding stream that allows GIS users in Arkansas to anticipate when the orthophotography will be updated.



The 2006 orthophotography data set as depicted through the GeoStor data viewer.

**IMPROVEMENTS THAT ARE REQUIRED.** To ensure that GIS users throughout the state have access to current, high-quality orthophotography, it is recommended that the state institute **a funded and recurring statewide orthophoto program**. Under this program, Arkansas would fly approximately 1/3 of the state every year resulting in orthophotography that is never more than three years old for any part of the state. Ideally, and over time<sup>4</sup>, the three year cycle would be synchronized with the Assessment Coordination Department’s real estate reappraisal cycle so that counties undergoing reappraisals have access to the most current imagery, and imagery that is never older than 3-years.

In addition to the recurring schedule, it is recommended that the state consider **improving the resolution of its orthophotography from 1 meter to 1 foot**. During the stakeholder workshops (see **Appendix 2**) there was a strong preference for higher resolution imagery which would open up and/or improve many different types of applications, such as land development and forest cover change detection, assessment “real property discovery”, and effective parcel mapping in urban areas.



The images on the left show the state’s 1-meter imagery and the images on the right show 1-foot resolution imagery from Pulaski County.

The most important element of this proposal is that it provides a reliable and recurring source of orthophotography. With a known schedule of recurrence, the state’s partners will have a target that they can budget against and the counties should be well positioned to seek **and leverage additional partner funding**. The current system involves orthophotography projects appearing opportunistically and many interested participants do not have the time, or budgetary flexibility to participate. The three-year recurring cycle provides up to three years for partners to arrange funding participation.

The proposed program retains several characteristics from New York’s model program. One additional element that should be carried over from New York is issuing a contract with the explicit provision that **allows partners to “buy up” off of the state’s overarching contract**. In this manner, a county could add additional moneys to procure additional products that can be produced by the contractor. Examples of products that might be “bought up” include higher resolution imagery (e.g. 3”-6”), planimetric layers such as building footprints or digital elevation products such as LiDAR and contours which are produced

<sup>4</sup> Currently, the ACD reappraisal cycle does not group counties geographically. To ensure cost effectiveness, an orthophotography mission must be planned so that large *contiguous* blocks of counties are flown at one time. Thus, over time ACD may want to adjust some county reappraisal cycles so that they align with the orthophotography program.

through the same photogrammetric technologies that are used for orthophotography. In addition to the benefit of catalyzing improved county data that the state will have access to, such a buy-up mechanism provides counties administrative efficiencies in voluntarily avoiding complex technical procurements.

**HOW TO GET THERE.** The State GIS Board and the AGIO need to work with the current administration and legislature to **obtain a budgetary line item** for the AGIO that will be sufficient to cover the anticipated annual costs which are outlined below.

Once the budgetary line item is obtained, the AGIO will need **to issue a formal procurement** for photogrammetric services that will cover a recurring statewide orthophotography cycle while providing a local buy-up provision. It is recommended that the contract term cover at least one complete, statewide cycle, while providing an option for a second cycle should there be exemplary performance on the first cycle.

**WHAT IT WILL COST.** Current industry estimates for the cost of a statewide, 1 foot resolution, 4-band original digital capture mission are: **\$3,000,000 - \$3,500,000** for Arkansas's approximately 53,000 square miles. Since this figure represents the "full state" price, the **annual cost** is estimated to be \$1,000,000 - \$1,170,000. These figures include the costs of improving the state's underlying digital elevation model to support 1 foot orthophotography.

It should be noted that photogrammetry and digital image capture are technologies that undergo continual technological improvements and that costs are shifting. For example, at the annual 2009 NSGIC conference, Microsoft made an announcement that they were entering the statewide orthophoto marketplace, and they have since entered into a contract with Michigan. Such developments will continue to impact the competitive landscape and pricing.

**EXPECTED BENEFITS.** As described above, orthophotography is one of the most popular and widely used geospatial data sets. Literally, every organization utilizing GIS and almost every geospatial application created by those organizations will benefit from access to high quality and *current* data. The following provides three specific examples of tangible benefits to important issues in Arkansas:

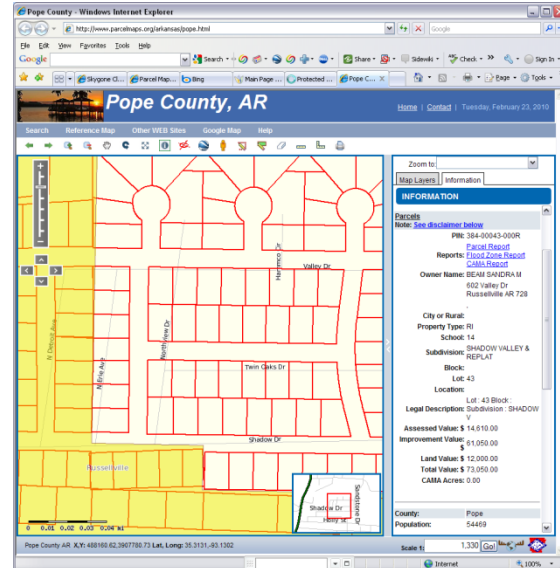
1. Orthophotography serves as the **core base map** for most GIS installations. Orthophotography represents the "visible geography" and thus most other data layers must be designed to properly overlay and not conflict with the imagery. It is apparent, even to a non-professional, that "something is wrong" when a road line does not match how the road is depicted in an orthophoto that shows the pavement and sidewalk. Beyond roads, other data sets that should "match" the orthophotos include parcels, hydrography and political/administrative boundaries. Given its role as a **core base layer**, it is all the more vital that this layer be of high quality and reliable currency. The proposed program will increase the quality and accuracy of this data set by going from 1 meter to 1 foot resolution and the recurring nature of the program will guarantee that it will never be more than three years out of date.

2. Orthophotography has been **an important asset in the state's economic development and business recruitment efforts**. When businesses, or their site selection consultants are looking for properties, it is critical that they be able to view those properties in the context of *current* conditions on the ground. Older or less detailed imagery, may not be able to provide sufficient information for their planning or decision making. The recurring program recommended above will ensure that Arkansas' statewide imagery is as good as any other state, and it will be far better than most.
  
3. As detailed below (see [Section 3.3.2](#)), GIS has proven an invaluable tool for helping local assessors identify new development that may impact the assessed value. This process of "real property discovery" **helps put new development onto the tax roles, and this will increase the revenues that are available to the county** and school systems. Critically, many of these changes can be efficiently uncovered from the assessor's office and with a reduced need for fieldwork. The more current and detailed the orthophotography, the more effective the assessor can be in identifying and tracking changes, and validating that these changes result in fair reappraisals. These types of operations are important enough that Benton County and Washington County *self-fund* detailed orthophotography missions for this express purpose on an *annual basis*.

### 3.3.2 Parcels – Annual Cost for 5 years: \$1,503,000

**BACKGROUND.** The current State GIS Board was originally named the State Land Information Board when it was formed in 1997, and this reflects the state's long standing interest in developing an electronic cadastre, or in other words, a **statewide digital parcel data layer**. Indeed, parcel mapping is a key requirement for conducting fair and equal appraisals and it has been clear for at least a decade that electronic, GIS-based mapping is the most efficient way of mapping parcels.

Nevertheless, and in spite of 13 years of progress, Arkansas has only completed electronic parcel mapping for approximately 50% of the state. Further, and exacerbating the situation, many counties continue to not have even hard copy plat maps that show the parcel layouts across the



On-line parcel mapping web-site showing selected computer assisted mass appraisal (CAMA) data from Pope County.



county<sup>5</sup>. Consequently, this section recommends the acceleration of parcel mapping and the near term completion of statewide parcels data layer. In addition to a wide variety of ancillary GIS benefits, at a base level this data set would lead to improved operations within county assessment offices across the state. As Almy, Gloudemans, Jacobs & Denne found in a report issued for the ACD in 2006, complete mapping and “better use of contemporary information technology would improv(e) the equity of the real property tax and the efficiency of assessment operations...”

**IMPROVEMENTS THAT ARE REQUIRED.** Accelerate work to **complete a statewide parcels data layer**, as soon as possible and **within 5 years**. This includes completing parcel mapping and parcel polygon automation in counties where the work is not yet done, as well as additional work to potentially improve and standardize the parcels in counties that have parcel maps. For example, in some counties work should proceed to improve the quality of electronic parcel mapping so that the parcels match the orthophoto base map better.

Based on research conducted by the AGIO as part of this project in November, 2009 (See [Appendix 3](#)), approximately 53% of the state’s parcels have been automated as polygons. As the table below indicates, approximately 13 counties are 100% complete, and 16 counties have not begun parcel automation, with another 45 counties in the process of automating their parcels.

	% Parcel Polygon Completion	# Co's	Parcels	Automated	To Be Automated	% Complete
"Maintenance" Counties**	97%-100%	14	705,485	703,026	2,459	99.7%
"Underway" Counties	34%-92%	25	650,905	384,891	266,014	59.1%
"Started" Counties	1% - 24%	20	498,765	55,347	443,418	11.1%
"Not Started" Counties	0%	16	307,409	0	307,409	0.0%
<b>TOTAL</b>		<b>75</b>	<b>2,162,564</b>	<b>1,143,264</b>	<b>1,019,300</b>	<b>52.9%</b>

Please note that estimating the amount of parcel automation that is required is a difficult task and the numbers presented in the table below should be considered a *best available estimate*. This difficulty stems from several factors:

1. Parcel automation is occurring on an ongoing basis so these numbers literally change daily.
2. It is impossible to determine the actual number of polygons that need to be automated until all parcel automation is complete, particularly for counties that do not yet have plat maps. Indeed, the process of completing mapping uncover hidden errors and helps to determine the actual parcel count.
3. In the absence of county-wide mapping, parcel counts are taken from ACD’s records. However, due to situations such as condominiums, or the combination of agricultural parcels owned by the

<sup>5</sup> Instead, these counties rely on a myriad of individual sub-division plans that have been accumulated over the years.

same tax payer, each tax record counted by ACD is not necessarily represented by a single parcel polygon. Thus, even in the counties which have completed mapping, there remains a difference between the “polygon count” and the “ACD tax record” count (e.g., as illustrated in [Appendix 3](#), in Sebastian County, ACD counts 54,094 parcels where as the completed data set contains 55,511 parcels, or 102.6% of ACD’s count).

**HOW TO GET THERE.** Given that 13 years since the formation of the State Land Information Board (i.e., the predecessor of the State GIS Board), only approximately half of state’s parcels have been automated through the independent efforts of counties and the limited support provided by the state in the form of the County Assessor’s Mapping Program<sup>6</sup> (CAMP), it would appear that a greater degree of direct funding support and/or some kind of mandate will be necessary to complete this effort on a statewide basis. The hardware, software, base map data and training that CAMP has provided has helped, but it is not enough. At the current rate of progress, it may take well over a decade for statewide parcels to be completed. Further, given the fact that after many decades several counties still do not have plat maps, and 16 counties have not yet commenced parcel automation at all, **statewide parcel mapping may never happen “on its own.”**

Thus, it is recommended that the state undertake a systematic program to provide direct funding support to counties to **complete statewide parcel polygon automation within 5 years**. Such a program would involve a reexamination and potential update of the state’s **parcel data standard**<sup>7</sup> so that it expressly anticipates the creation of a uniform, statewide data layer. The details of the form and volume of direct support will need to be determined in association with current administration and the legislature, but it can be anticipated to take several forms that account for the varying levels of GIS maturity found in counties.

1. Providing direct funding support to **initiate parcel automation** in the approximately 16 counties that have not started. This funding will support *new projects* that will create parcel polygon data that adheres to state standards.
2. Providing direct funding support to **accelerate the completion of parcel automation** in counties that have already started the automation process. This funding would support additional, temporary staff to get the work done more quickly, or the outsourcing of the completion of work via the private sector. Any automation supported through this funding would need to adhere to state standards, and thus some funding may be required to retrofit existing parcels to better match the standard.
3. Providing direct funding to **support parcel improvements** in counties that have completed automation in order to facilitate the assembly of a uniform statewide data layer. Three issues, which should be addressed in the final parcel standard, are of particular importance:

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<sup>6</sup> See: [http://www.gis.state.ar.us/Programs/Programs\\_current/CAMP\\_index.htm](http://www.gis.state.ar.us/Programs/Programs_current/CAMP_index.htm) for detailed information on this program.

<sup>7</sup> See: [http://www.gis.state.ar.us/Downloads/CAMP/Resources/Standards/Cad\\_standard\\_FINAL.pdf](http://www.gis.state.ar.us/Downloads/CAMP/Resources/Standards/Cad_standard_FINAL.pdf) for a copy of the existing state parcel data standard.

- ★ Defining the level of accuracy and ensuring that there is a reasonable, and logically consistent overlay with the state’s orthophoto base map.
- ★ Implementing logical and understandable parcel ID numbering systems that ensure that parcel polygons can be linked to county CAMA systems, and can handle condominium and “combined agricultural” parcels situations.
- ★ Defining a “submittal format” that counties can meet from their native systems so that a statewide layer can be assembled and managed by the AGIO. This submittal format should include requirements for standardized metadata production and delivery.

While providing counties 100% of the funding necessary to complete the statewide layer might be the safest tact, it is critical that there is county buy-in to the notion of electronic parcel data management. As a result, it is recommended that this program be implemented with **the state providing 70% of the funding with the balance coming from a required 30% match from counties**. Indeed, it is not enough to simply automate the parcels, but counties must be prepared to take on the annual maintenance of these data as sub-divisions and other parcel transactions occur.

While it cannot be guaranteed that all counties will participate, this level of funding should be adequate to attract the vast majority of counties who are already interested in – with many actively engaged in – parcel mapping. Indeed, the counties will be the primary beneficiaries of the parcel data that is created. During late 2009 and into early 2010 this concept was validated via a very limited parcel grant program that was instituted by the AGIO. With a small pool of \$60,000 that wouldn’t approach a 70% contribution, and was to be divided among several counties, the AGIO attracted 6 serious grant applications. Ultimately, grant awards were made to Jefferson County, Polk County and White County (see **Appendix 4** for the AGIO’s grant announcement). **In making this \$60,000 worth of grants, the AGIO secured a commitment of \$80,000 worth of county, city and utility company contributions**, proving that grants can be an extremely effective mechanism for leveraging the states funding with further local funds.

Given that the state will provide the majority of funding, it is recommended that the state issue a contract for parcel automation that obtains pricing based on the state’s group purchasing power. Such a contract may be awarded to multiple vendors capable of meeting the state’s needs to facilitate the work of multiple counties proceeding in parallel. The state would then issue task orders on a county-by-county basis and manage payments after securing county matching funds and performing appropriate quality control in association with counties.

To the extent possible, this program should be closely coordinated with ACD so that they can provide guidance to counties on the importance and relevance of mapping to fair and efficient assessment. Ultimately, Arkansas should consider whether ACD should mandate that counties produce and maintain electronic, countywide tax mapping. Such collaboration would be a logical extension the AGIO’s and ACD’s existing and ongoing “cooperative partnership” through the County Assessors Mapping Program (CAMP).

If after several years, the 70% match proves inadequate to achieve 100% parcel coverage, then the State GIS Board and AGIO would work with the administration and legislature to determine a strategy for addressing the holdouts and completing the state.

**WHAT IT WILL COST.** Based on discussions with several companies<sup>8</sup> that do county based parcel mapping in the region it is estimated that **contracted parcel automation would cost between \$3.75 and \$11.00 per parcel**. The relatively large cost variation is based on several factors:

1. Whether, or not county **plat maps exist**. Automating existing plat maps is far less costly than a requirement to perform new mapping and automation from existing plans.
2. The **quality of a county's maps and plans**. A series of well organized and high quality plat maps and/or plans can be automated for a lower cost than county records that need extensive research and organization. In addition, some existing mapping is more accurate than others. For example, it is less costly to automate plat maps and plans that properly overlay orthophotography than it is to automate maps and plans that will require adjustment to fit the orthophotography.
3. **The size of the automation project**. There are economies of scale to ramping up large scale parcel automation efforts. In general, larger pools of work allow contractors to ramp up their capacity and achieve lower unit costs.

Based on the parcel automation inventory work completed in November, 2009, the following bullets summarize the results of a *conservative* cost model for 100% of the cost of completing parcel automation for the state.

- ★ Automating approximately 95,000 parcels from plat maps
- ★ Mapping and automating approximately 924,000 parcels
- ★ **Would cost approximately \$10,738,000**

Note: please see **Appendix 3** for more comprehensive information on the parcel cost model that is summarized in the above and is based on data from Nov. 2009

Thus, based on the previous recommendation that the **state provide 70% funding** to be shared with counties, the state's overall share is estimated to be: **\$7,515,000**. If the state pursues a 5-year program, the **annual cost** is estimated to be: **\$1,503,000** per year.

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<sup>8</sup> The companies surveyed included: actGeospatial Inc. from North Little Rock, AR; Midland GIS Solutions from Maryville, MO; and VillaGIS, Inc. from Hollister, MO.

A few further notes on these anticipated costs are warranted:

1. The per parcel costs described above are higher in Arkansas than for other regions of the country due to the large number of parcels that require original mapping from deeds and plans (as opposed to simple automation from plat maps).
2. It is anticipated that these costs could be driven lower with the increased competition that might be expected from large scale state and county purchases of these services.

**EXPECTED BENEFITS.** Parcels are a critical and versatile data set that is required by the vast majority of state and county GIS practitioners. Even with only 50% parcel of the parcels in the state automated, and a much smaller percentage of those parcel available via the GeoStor database, between May, 2006 and June, 2009 parcel data access accounted for 13% of GeoStor’s web service utilization. Simply put, investments in parcels will benefit a very broad cross section of the geospatial stakeholder community.

1. Completion of parcels will lead to **improved efficiency and equity in property tax assessment, revaluation and revenue collection**. Specific examples include, but are not limited to:
  - ★ **Finding new, untaxed development on existing parcels.** Once parcels are automated, then Tax Assessors can compare those properties to the orthophotography and the existing CAMA database. From those comparisons, Tax Assessors can see whether the CAMA record accounts for all the real property (e.g. structures, mobile homes, etc.) that is visible in the orthophoto.
  - ★ **Performing automated agricultural land assessment based on soils.** Since the state’s soils data are already automated, if parcel polygon data exists, then a GIS-based analysis can be performed that will summarize the soil types found on each property. Such an automated analysis can be completed for an entire county in matter of days whereas manual techniques would take months. The automated analysis will also yield more accurate and repeatable results.
  - ★ **Increased ability to perform analysis** such as viewing assessment sales ratios (ASRs) across an entire county to look for clusters of high or low values. Such tools give Tax Assessor’s an increased ability to look at the fairness of their revaluations and an opportunity to adjust revaluation models that may be yielding skewed results.

2. **Increased revenue collection from property taxes that will lead to increased school funding.** As described above, new GIS tools give Assessors an increased ability to identify real property that was previously not on the tax roles. Once such properties are identified, the valuation of the entire county will rise as will the revenues that are collected. The Sharp County Tax Assessor observed during the Jonesboro stakeholder workshop that she estimated that **county-wide valuations have increased 10%** via real property discovery and finding previously “unmapped” parcels. She also reported that as a result her School Superintendents have become important GIS allies. Indeed, the schools are the primary beneficiaries of comprehensive and efficient assessment and revenue collection.

“We are at a point in Arkansas where the Department of Education, Superintendents, Administrators, Principals, School Boards, and Transportation Directors must have maps with vital property assessment, student resident, school location and bus routing for many important decisions. This decision and planning tool will help develop a more efficient and effective educational program for our citizens. We need to make sure our education system in Arkansas is aware and able to utilize this resource and connect them with the people creating the data in the counties.”

**Tom W. Kimbrell, Ed.D.**  
**Commissioner of Education**  
**Arkansas Department of Education**

3. **Routine state government planning and decision making.** A wide variety of state planners and policy makers require access to, and would benefit from statewide parcels. For instance, the state is a major property owner and benefits greatly from understanding who its neighbors are, and what is occurring on abutting property. The Arkansas Game and Fish Commission provided the following example of a real world request for statewide parcel data that could not be currently answered. Routinely, managers will ask for the property boundary of a state Wildlife Management Area (WMA) as well the “boundary and owner information for all lands adjacent to the WMA”.

4. **Statewide parcels will provide a key tool for economic development** and meeting site selection consultant requirements. When businesses, or their site selection consultants are looking for properties, it is critical that they be easily able to access the property lines and key characteristics of the parcels such as the current assessed value. Of equal importance can be information on abutting properties such as the number of neighbors a given parcel may have. Counties that have their parcels completed and on-line are at a distinct advantage in this arena compared to other counties in Arkansas. Recognizing this, Arkansas’ Site Selection Center web-site<sup>9</sup>

*In referring to the Arkansas Site Selection Center’s “Geospatial Data Download” capability, Governor Beebe said:*

“If your community is not on here, if your community is only here with half of the things that it should have on it, if your community hasn’t in effect done those things that they can do to put their best foot forward and have it reflected on something that is going to be viewed by site selectors across ... the world as we have seen in recent months, then you are going to fall behind.”

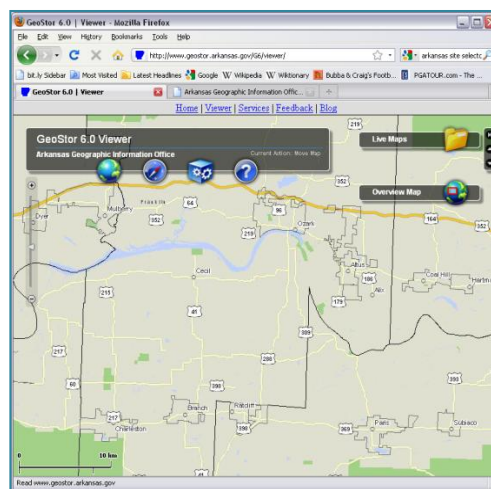
<sup>9</sup> See: <http://www.arkansassiteselection.com/> for further details.

makes existing parcel data readily available to businesses looking for property.

5. In addition to the data content benefits described above, parcels –like orthophotography – fulfill an important base map function. Specifically, a variety of political and administrative boundaries such as **school districts or incorporated city boundaries should be coincident with parcels**. Put another way, a given parcel should not be split by a city or school district boundary so that there is no ambiguity about the taxation and services provided to that parcel. Without statewide parcels, it will be impossible to properly map such boundaries and there will continue to be inequities and time spent resolving jurisdictional boundary questions.
6. The state has a vital interest in assembling a comprehensive, statewide address database for a variety of reasons, particularly in the public safety and emergency response arenas. Indeed, a working and effective E911 system requires current and accurate addressing. While there has been great progress in building this resource, there is additional work required to assemble a more accurate and current statewide address inventory. **Statewide parcels would provide an invaluable tool in assembling the statewide address databases**. While a single parcel can have multiple addresses (e.g. for apartments or various commercial properties), the statewide parcel data would provide an accurate inventory of all places that *should be* addressed and in combination with assessor's CAMA data an important cross check for address accuracy.

### 3.3.3 Political & Administrative Boundaries – Annual Cost: \$75,000

**BACKGROUND.** Political and administrative boundaries are critical and fundamental data sets. Nevertheless, many of these jurisdictions were created over 100 years ago and the precise location of these boundaries is extremely difficult to determine without costly surveying. In short, one cannot see political or administrative boundaries on the ground and with one's own eyes. At the same time, such boundaries are used to determine critical items such as the tax jurisdictions a property falls within; the tax rates that apply to a property; representation in the legislature and the school that children attend. Modern mapping and geospatial technologies are capable of providing accurate mapping, however, in spite of the importance of these data, the existing digital data (i.e. the original source maps that were automated) and the workflows used to determine boundary changes are antiquated, and at times inaccurate.



County and city boundaries for parts of Franklin and Logan counties as depicted through the GeoStor data viewer.





Example of an inaccurate school district line between the Jonesboro and Valley View school districts that was discovered by reviewing the lines in association with parcel data. According to the Craighead County Assessor's Office – who provided this image – this error impacted approximately 27 parcels before it was corrected.

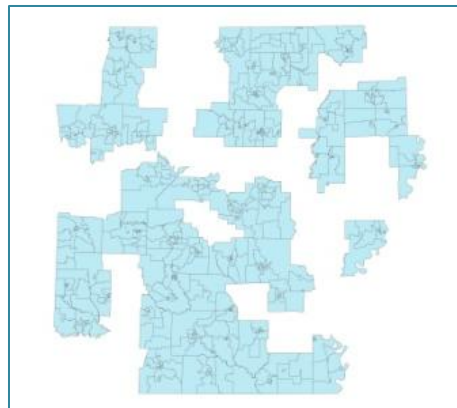
**IMPROVEMENTS THAT ARE REQUIRED.** The accuracy and currency of political and administrative boundaries, and their electronic representation **should be improved**. The core jurisdictional boundaries that the AGIO currently maintains and/or distributes include:

- ★ **City boundaries**, in association with the AHTD
- ★ **School district boundaries**, in association with UALR
- ★ **Political and voting districts**, in association with the Secretary of State

In addition, there should be an ongoing program to assist in the mapping and publication of additional administrative districts with taxation or public safety implications such as levee districts.

In general, all these boundaries have two potential shortcomings that may be reflected in the publicly available electronic data, and that should be improved:

1. The electronic depiction of boundary lines do not have the accuracy to definitively determine which addresses and/or utility poles fall within a given jurisdiction (see school district example above).
2. The data sets do not necessarily reflect the most recent boundary changes, particularly for municipal annexations.
3. Data automation is not yet complete. For example, as the map to the right demonstrates, data on the County Quorum Court, Justice of Peace districts are only available for 43 of the state's 75 counties. Having these data available on a statewide basis will be increasingly important given the redistricting that will take place beginning in 2011.



Status map showing completion status for county Justice of the Peace districts.

**HOW TO GET THERE.** There are two principal activities that should be pursued to initiate these improvements.

**First, there should be legislative clarification** of the annexation process and further supervision to ensure that the same process is being followed by all jurisdictions. During the stakeholder workshops this

process was described by several different jurisdictions, in several different ways (i.e., the timing and agencies involved differed). At a minimum, there appears to be a variety of interpretations and this has resulted in a variety of timelines. The net result has been that in some jurisdictions, notification of an annexation to the state, and the related availability of the new boundary in the state database has been delayed.

Understandably, current legislation was drafted before the advent of electronic mapping, the AGIO and the GeoStor database. Similarly, the current annexation process did not envision broad use of geospatial technologies whereby utilities are using their systems in an attempt to identify which utility poles are subject to local taxes based on electronic boundary lines. A key step in improving the current boundaries would be legislative clarification of the process that involves some kind of **recognition of the AGIO and the GeoStor database as the official repository** for completed and approved boundaries that must be submitted in *electronic form*. Such a process might clarify that the annexation cannot become final until the data are *publicly available* through the state's database. In this manner, all communities would need to follow the same process, and the state would have an opportunity to provide a data review prior to annexations being completed.

Second, whenever possible and until statewide parcels are available, **administrative boundaries should be constructed so that they match parcel lines**. As statewide parcel polygons continue to be completed, existing boundaries should also be adjusted to match parcel linework whenever possible so that there is no ambiguity as to which district a given parcel falls within. Obviously, this will need to be an ongoing effort that is aligned with the statewide effort to complete parcels described above (see [Section 3.3.2](#)).

**WHAT IT WILL COST.** At present, it is simply recommended that the legislation, workflow and processes of boundary determination be clarified, and potentially modernized. In addition, it is recommended that new standards of boundary accuracy be put forward that acknowledge the importance of the overlay between parcels and political and administrative boundaries. Neither of these changes is anticipated to cost money, and it is not recommended that the state undertake a large scale and potentially costly "boundary improvement" effort until after the legislative and workflow improvements are made, and most likely until after statewide parcels are completed.

In the interim, it is recommended that **a new "boundary data layer manager" position be created within the AGIO** that focuses exclusively on political and administrative boundary data stewardship. It is envisioned that this person would take the lead in working with other state agencies, the administration and legislature on the technical elements of legislative clarification. This person would also work with individual counties to help them understand any new requirements and also how to perform the technical work of boundary improvement. Finally, this person would work in concert with existing personnel at the AHTD, UALR and Secretary of State who are involved in assembling and updating the statewide city boundary, school district and legislative district boundary data layers.

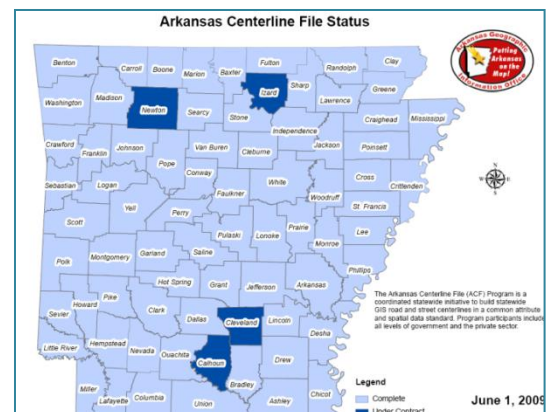
As a result, the only new cost anticipated for this recommendation is a **adding a GIS Analyst (DFA-OPM C123) position to AGIO. This is estimated to be in the range of \$50,000 - \$75,000 per year for salary and benefits.**

**EXPECTED BENEFITS.** The primary benefit of these types of improvements will be increased reliability and accuracy of the jurisdictional boundary data sets. This increased reliability ultimately means that decisions and assessments that are made based on political or administrative boundaries will be fairer to both the tax payers and the taxing entities. In this manner, **taxing authorities will collect all revenues that are due to them, and by association tax payers will be equitably paying for the services that they receive.**

A secondary benefit of these improvements will be the **removal of significant duplicated effort by multiple levels of government that are mapping political and administrative boundaries.** For instance, during the stakeholder workshops, it was documented that in addition to the state, many individual cities, counties and utilities currently have overlapping efforts aimed at mapping annexations. A clarified workflow should result in a single annexation boundary being carried throughout the process, and then at the end of the process when the boundary is approved, it is made publicly available to everyone via the AGIO and GeoStor. Thus, the primary actor in the workflow (e.g. a municipality initiating an annexation) would be responsible for accurate mapping, and then at the end of the process the impacted county, utilities and the state would gain access to the new boundary.

### 3.3.4 Road Centerlines – Annual Cost: \$200,000

**BACKGROUND.** While almost everyone is familiar with old fashioned “street maps” and increasingly with mapping web-sites such as Google Maps, Bing Maps or MapQuest, fewer people understand that street mapping is a challenging exercise and that maps can be inaccurate, or just plain wrong. Indeed, roads are constantly being constructed and even existing roads may have their names changed. Commercial mapping organizations – both hard copy, and on the web – often rely on *government mapping* efforts. This effect can be exacerbated in more rural places whereas there is less demand for these data and commercial organizations may focus on the more popular (and populated) parts of the country. In short, the road data and GPS navigability of Los Angeles, California is more likely to be current than for a rural county in Arkansas.



To address this market reality, Arkansas – through the AGIO – has undertaken the Arkansas Centerline File (ACF) which, according to the ACF web-page, is designed to “compile a standardized statewide road centerline GIS map data layer that can be used by all levels of government, the private sector and

individuals.” The unique element of the ACF program is that it is “built from many different local source (city and county) datasets using a common standard...the State simply integrates the various local sources into a common format in a standardized and consistent manner across jurisdictional boundaries.” As the map above from June, 2009 shows, after approximately eight years of effort, the state is nearly finished with all counties either complete, or under contract.

**IMPROVEMENTS THAT ARE REQUIRED.** With the initial focus on the ACF being the completion of a statewide road centerline data set, it is now time to **shift the emphasis to the ongoing maintenance and improvement** of this critical resource. There are three primary types of improvement that are required:

1. The road data in the ACF file should not exceed one year of age. In other words, the **data in the ACF should be maintained on at least an annual basis**. In the current edition of the ACF, the data for some counties has not been updated since 2008.

2. The **quality of line work is variable across the state**. In some parts of the state the lines match the orthophotography base map well, in other parts the match is off and this can lead to end user confusion (see image to the right).



The image above shows an area adjacent to the Cabot City boundary. Note how the yellow ACF line does not accurately match the depiction of the road in the orthophoto.

3. Increased emphasis should be placed on **extending the ACF to contain improved addressing data**, including the development of countywide address point data sets. As described above, with the increasing availability of countywide parcel data sets there will be new opportunities to further improve the address information contained and maintained through the ACF.

**HOW TO GET THERE.** The **next phase of the ACF program should focus on regularizing data update and improving data accuracy**. This should begin with an expansion of the ACF Data Standard, whose publication date is June, 2002, to include guidance on expected and/or required data update cycles (e.g. at least one update annually).

Similarly, **the ACF Data Standard should be updated to provide clearer standards for the expected quality of line work**, including issues such as: expected level of match and consistency with the statewide orthophoto base maps and edgematching to neighboring counties.

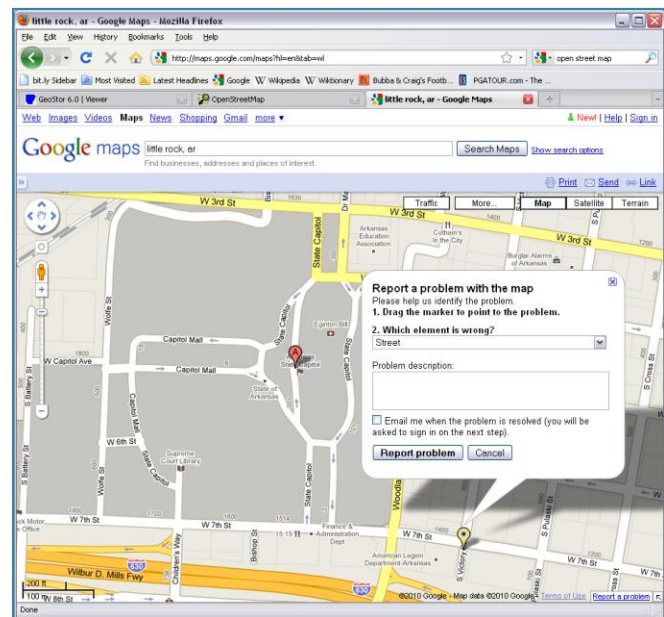
As the first phase of the ACF demonstrated, it is critical that **counties be provided technical assistance** that will help them meet more rigorous standards for data update and the line work improvement processes. As with the first phase, such technical assistance should continue to be provided via the direct



support of AGIO staff who regularly visit counties. It is also recommended that this technical support be supplemented with a grant program to help fund county efforts to update their data, particularly in counties that do not yet have in-house GIS capabilities.

In addition, the AGIO should work on improving its technical infrastructure so that counties that are successfully maintaining their street centerline data on a regular basis can submit their data for inclusion into the statewide ACF on a regular basis. Right now, advanced counties – such as Pulaski County – maintain data that are significantly more current than what is available in the ACF. Such counties would like to see their improvements show up in the ACF with less lag time. As the ACF moves into maintenance mode, a technical architecture for accepting “trusted contributions” from authorized partners and employing techniques such as database replication should be considered. Automated, or semi-automated routines and workflows for maintaining the ACF will become increasingly important as the volume of updates increases.

Finally, as the general public becomes increasingly sophisticated with web-based mapping technologies, it will become increasingly important for organizations such as the AGIO to **have a strategy for both communicating and collaborating with the public on data quality issues.** Indeed, members of the general public may be the first to notice shortcomings in the state’s geospatial data. Initiatives such as OpenStreetMap<sup>10</sup> are built on the premise that “volunteered geographic information” (VGI) from a network of public contributors is the best way of ensuring that roads data is kept current. Similarly, Google Maps now contains a “Report a problem” link which allows the public to notify them of data problems that are encountered (see image above). At a minimum, the AGIO should facilitate the development of a web-based and geo-enabled capability for the general public to report errors as well as submit questions and suggestions on the GIS data layers that the state maintains.



**WHAT IT WILL COST.** It is recommended that a **new position be created within the AGIO that focuses exclusively on furthering the ACF program and overall road centerline data stewardship.** As with current AGIO personnel who work on ACF, this person would work closely with county data partners and would *actively solicit* data updates. This person would provide technical assistance to counties that are having difficulty with data update and would work to foster best practices for road data maintenance across the

<sup>10</sup> See: <http://www.openstreetmap.org/> for further information.

geospatial stakeholder community. This person would also be responsible for assembling county contributions into a coherent, statewide data set and working with the AGIO technical team on next generation approaches for integrating contributed data into a statewide data set and soliciting public comment on data holdings. The cost for this **new position is estimated to be in the range of \$50,000 - \$75,000 per year for salary** and benefits.

In addition to a new, dedicated position, it is recommended that a pool of resources ranging from **\$75,000 - \$125,000 annually be provided for a grant program aimed assisting counties in their ability to update and improve their road centerline data**. This grant program would represent an annual state investment in the maintenance of a mission critical data set.



The road ahead for making all required improvements to the ACF may be “crooked and steep”, but the benefits from success will be large.

**EXPECTED BENEFITS.** Roads represent a crucial framework data set that is used by almost the entire geospatial community. As such, it is critical that these data be as reliable, accurate and current as possible. It will not be easy to make all required improvements, but if they are achieved there will be large benefits experienced by a large cross section of Arkansans. Examples of specific anticipated benefits include, but are not limited to:

1. One of the core drivers of the development of the ACF was completing the addressing required for automated E911 systems. These systems, driven by ACF data are used on a daily basis for emergency response. Improvements to the quality and currency of the street centerline will lead to more accurate dispatching and more efficient routing of emergency vehicles providing **overall improvements in public safety and preparedness**. Similarly, improved roads will help improve emergency planning activities such as the creation of safe and efficient evacuation routes.
2. Strong and reliable statewide road centerline data set would likely be incorporated into commercial road centerline data products and mapping web-sites (e.g. Google Maps, MapQuest, et al) providing **accurate geolocation, more reliable GPS navigation and convenience for the general public**. Indeed, this process has already started. In their Fall Quarterly Newsletter<sup>11</sup>, NAVTEQ Inc. – one of two dominant commercial road centerline data providers – announced that it had developed a “strategic relationship” with the AGIO that would result in the ACF being integrated into their commercial products. Similarly, in February of 2010, TeleAtlas – the other major commercial road centerline data provider – informed the AGIO that they had used the ACF to edit their commercial product.
3. While difficult to measure, improvements to the ACF which end up improving the commercial mapping data that businesses rely on, will lead to more efficient routing and **an improved flow of goods and services across Arkansas**. Already, the AGIO regularly hears from citizens who are

<sup>11</sup> The Newsletter article was titled: “NAVTEQ Integrates Data from the State of Arkansas to Create Fresh, Accurate and Reliable Map Updates”

frustrated that street and address changes aren't reflected in the commercial data used by the national package delivery companies. A concerned citizen from Cash in Craighead County wrote "I can no longer be found at my address by UPS or Fed.Ex. My utility service companies with home offices outside of the state can't find my location to dispatch service technicians. This problem seems to be growing a life of it's (sic) own..." believing that official "government maps" were the source of her problem. Rather, the state's ACF data properly reflects her correct address but the commercial road centerline data used by UPS and FedEx apparently do not. As the ACF continues to improve its accuracy, currency and reliability, it will continue to be picked up by the commercial data providers in the manner NAVTEQ has already done. With higher quality, the state may also consider being proactive in providing its data to the commercial companies.

4. Improved road centerline quality and currency will assist in routine state government production of road mapping and the GPS navigation of state employees. The following two examples come from the Arkansas Department of Fish and Game (DFG):
  - ★ The Communications Division periodically produces a map book that shows all DFG properties and facilities in each county. The management of the Division assumed and expected that accurate and current roads, including forest roads was available for every county. Without these data the map books will not portray the full picture of access to DFG facilities. The centerline improvements described above will address these shortcomings.
  - ★ The Enforcement Division uses GPS units to assist in navigation and locating their whereabouts in the sometimes remote parts of the state they visit. The Division routinely reports situations where field crews could not locate themselves due to roads not being portrayed on the GPS unit. As with the general public, state government will benefit from improved and more current roads data being made available to the commercial mapping sector.



## 4. Budget Overview

The following provides a summary of the expenditures that are anticipated to implement the four major recommendations outlined above. In addition, given the current lack of administrative support and an increased level of activity, the budget below recommends the creation of an Administrative Assistant position for the AGIO. Although the narrative above presents some costs as budget ranges, for budgeting purposes, the spreadsheet below presents the higher cost estimate from any budget range.

Arkansas Geospatial Strategic Business Plan				
Budget for implementing recommendations				
5 year program				
Recommended Activity	Additional Funding Need	Additional One-time Funding Need	Overall Amount for 5 years	Notes
Annual Orthoimagery Program	\$1,166,667		\$5,833,333	Cost represents 1 ft. resolution with a 3-year statewide cycle (i.e., 33% of the state/year). "Overall Amount" represents costs across five years (i.e. 1.67 statewide imagery cycles).
Completion of statewide parcels		\$1,503,000	\$7,515,000	Cost allocated across 5-years as a 5-year "general improvement program". Cost represents the state paying 70% of total cost with the 30% that is not shown coming from matching funds from counties.
Political/Administrative boundary management	\$75,000		\$375,000	Cost represents a new staff person for the AGIO identified as the "Administrative Boundary Data Layer Manager".
Road and address data maintenance	\$200,000		\$1,000,000	Cost represents a new staff person for the AGIO identified as the "Road and Address Data Layer Manager" as well as \$125,000 of funds to be distributed to counties as grants to assist their road and address maintenance efforts.
Organizational maturity	\$50,000		\$250,000	Full-time "Administrative Assistant" position for the AGIO
<b>TOTAL</b>	<b>\$1,491,667</b>	<b>\$1,503,000</b>	<b>\$14,973,333</b>	

### 4.1 FUNDING MECHANISMS

The budget presented above proposes a mix of additional funding needed for the AGIO to fully carry out its mandate as well as a one-time funding request for the acceleration and completion of statewide parcels.

# Appendices

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1. Strategic Business Plan Workshop Presentation Materials
2. Strategic Business Plan Workshop Summaries
3. Parcel Development Status Spreadsheet
4. AGIO Announcement of 2010 Parcel Grant Awards